ATTACHMENT - CLAIMS LISTING

This listing of claims will replace all prior versions, and listings, of claims in the application.

1. (withdrawn) A method for measuring changes in stress in a specimen, comprising the steps of:

irradiating a specimen with an electron beam when the specimen is in a predetermined state and when the specimen is in a state different from the predetermined state, said irradiating of the specimen causing the specimen to generate light,

spectroscopically analyzing the light generated from the specimen by the irradiating step and obtaining a spectrum for the specimen in the predetermined state and in the different state, and

calculating a stress change in the specimen based on a shift of the spectrums obtained when the specimen is in the predetermined state and when the specimen in the different state.

2. (withdrawn) The method for stress measuring as claimed in claim 1, wherein a residual stress is obtained in the stress calculating step based on a spectrum shift between a specimen spectrum as being a spectrum in a state that no stress exists in the specimen and a stress impressed spectrum as being a spectrum in a state that a residual stress exists in the specimen.

3. (withdrawn) The method for stress measuring as claimed in claim 1, wherein

an external force impressing process that applies an external force to the specimen prior to the electron beam irradiating step is further provided, and

an internal stress is obtained in the stress calculating step based on a spectrum shift between an internal stress impressed spectrum as being a spectrum in a state that an internal stress is generated in the specimen by the external force impressing step and a specimen spectrum as being a spectrum in a state no stress exists in the specimen or a stress impressed spectrum as being a spectrum in a state that a residual stress exists in the specimen.

4. (withdrawn) The method for stress measuring as claimed in either one of claim 1 through claim 3, wherein

the electron beam irradiating step includes a broad area electron beam irradiating process that irradiates an electron beam without narrowing down on a broad area that is broad enough compared with a spot size of the electron beam that is narrowed down to obtain a requested space resolution, and

in the stress calculating step a spectrum obtained by analyzing light generated from the specimen by the broad area electron beam irradiating process is made to be a specimen spectrum as being a spectrum in a state that no stress exists in the specimen.

5. (withdrawn) The method for stress measuring as claimed in either one of claim 1 through claim 3, wherein

the electron beam irradiating step includes a broad area electron beam irradiating process that irradiates an electron beam on a broad area that is broad enough compared with a spot size of the electron beam that is narrowed down to obtain a requested space resolution with scanning the spot size, and

in the stress calculating step an average of spectra of light generated by irradiating each electron beam in the broad area electron beam irradiating step is made to be the specimen spectrum as being the spectrum in the state that no stress exists in the specimen.

6. (withdrawn) The method for stress measuring as claimed in claim 4, wherein the broad area is the entire area of the specimen.

7. (withdrawn) The method for stress measuring as claimed in claim 4, wherein a diameter of the broad area is set as not less than 100 times of the spot size of the electron beam that is narrowed down so as to obtain the required space resolution.

8. (withdrawn) The method for stress measuring as claimed in claim 1, wherein

a minute amount sample obtaining step that obtains a minute amount of a sample from the specimen is further included, and

in the stress calculating step a spectrum of light obtained by irradiating an electron beam on the minute amount sample is made to be a specimen spectrum as being a spectrum in a state that no stress exists in the specimen.

9. (withdrawn) The method for stress measuring as claimed in claim 1, wherein

a composition analyzing process that analyzes a partial difference of composition of the specimen is further included, and

in the stress calculating step the specimen spectrum is determined for each area where composition of the specimen differs obtained by the composition analyzing step in consideration of a spectrum shift generated due to the difference of composition.

10. (withdrawn) The method for stress measuring as claimed in claim 1, wherein

external light whose spectrum is known is irradiated in the above-mentioned electron beam irradiating process,

a spectrum of the external light and a spectrum of light emission from the specimen are obtained in the spectroscopy step, and

each position of spectra from the specimen in each state to be compared in order to measure a stress change is compensated based on the spectrum of the external light in the stress calculating step.

11. (withdrawn) The method for stress measuring as claimed in claim 10, wherein a position of a spectrum of a specimen spectrum as being the spectrum in the state that no stress exists in the specimen and a position of a spectrum of the stress impressed spectrum as being a spectrum in a state that a residual stress exists in the specimen are compensated respectively based on a spectrum of external light in the stress calculating step.

12. (withdrawn) The method for stress measuring as claimed in claim 10, wherein a position of a spectrum of an internal stress impressed spectrum as being a spectrum in a state that an internal stress exists in the specimen and a position of a spectrum of a specimen spectrum as being a spectrum in a state that no stress exists in the specimen or a position of a spectrum of the stress

impressed spectrum as being a spectrum in a state that a residual stress exists in the specimen are compensated respectively based on a spectrum of external light in the stress calculating step.

13. (withdrawn) The method for stress measuring as claimed in claim 10, wherein a predetermined peak wavelength as being a reference for the external light spectrum is set near a predetermined peak wavelength for the light emission spectrum from the specimen.

14. (withdrawn) The method for stress measuring as claimed in claim 1, wherein a correlation calculating step that calculates a correlation between an amount of external force impressed on the specimen and an amount of the spectrum shift is included prior to the stress calculating step.

15. (withdrawn) The method for stress measuring as claimed in claim 1, wherein the specimen includes at least one kind of an element selected from a family consisting of lanthanoid by an amount within a range of 1 ppm ~ 10000 ppm.

16. (withdrawn) The method for stress measuring as claimed in claim 15, wherein the lanthanoid is at least one element selected from a family consisting of Sm, Eu, Tb, Yb, La, Er, and Gd.

17. (currently amended) A stress measuring device for measuring a stress in a specimen comprising:

an electron beam irradiating unit that irradiates a specimen with an electron beam,

a spectroscopy unit that analyzes light generated from the specimen when the specimen is irradiated ~~by irradiation~~ with the electron beam from the irradiating unit so as to obtain a spectrum of the generated light from the specimen, and

a stress calculating unit that calculates a stress change in the specimen based on a shift of the spectrum of the generated light obtained as the specimen is irradiated with the electron beam from the irradiating unit when the specimen is in a predetermined state and when the specimen is in a state different from the predetermined state.

18. (currently amended) The stress measuring device as claimed in claim 17, wherein the stress calculating unit calculates ~~is to obtain~~ a residual stress ~~based on a spectrum shift between a specimen spectrum as being a spectrum in a~~ where the predetermined state is that where there is no stress ~~exists~~ in the specimen and ~~a stress impressed spectrum as being a spectrum in a state that~~ the different state is that where there is a residual stress ~~exists~~ in the specimen.

19. (currently amended) The stress measuring device as claimed in claim 17, ~~wherein~~ further including an external force impressing unit that applies an external force to the specimen ~~is further provided~~ which is measured by stress calculating unit.

20. (currently amended) The stress measuring device as claimed in claim 19, wherein the stress calculating unit ~~is to~~ obtains an internal stress from a spectrum shift between an internal stress impressed spectrum in a state that the internal stress is generated in the specimen by the external stress impressing unit and the specimen spectrum or the stress impressed spectrum.

21. (canceled)

22. (currently amended) The stress measuring device as claimed in claim 17, further including ~~wherein~~ a composition analyzing unit that analyses a partial difference of composition of the specimen ~~is further provided~~ at a measurement site before stress is applied so that the stress calculating unit calculates stress based on the partial difference of composition at the measurement site.

23. (currently amended) The stress measuring device as claimed in claim 17, further including ~~wherein~~ an external light irradiating unit that irradiates external light whose spectrum is known ~~is further provided~~.

24. (currently amended) The stress measuring device as claimed in claim 17, further including ~~wherein~~ a visualizing unit that visualizes a portion to be measured of the ~~above-mentioned~~ specimen so that the portion can be accurately measured again ~~is further provided~~.

25. (currently amended) The stress measuring device as claimed in claim 17, wherein a diameter of a beam spot of ~~an~~ the electron beam irradiated by the electron beam irradiating unit is not more than 100 nm.

26. (currently amended) The stress measuring device as claimed in claim 17, wherein the electron beam irradiating unit is a scanning electron microscope.

27. (currently amended) A stress measuring device for measuring a stress in a specimen comprising:

a light irradiating unit that irradiates a specimen with irradiating light,

a spectroscopy unit that analyzes light generated from the specimen by the irradiating light from the irradiating unit so as to obtain a spectrum of the generated light, and

a stress calculating unit that calculates a stress change in the specimen based on a shift of the spectrum of the generated light obtained as the specimen is irradiated with the light from the irradiating unit when the specimen is in a predetermined state and when the specimen is in a state different from the predetermined state,

wherein the light irradiating unit includes a broad area light irradiating device that irradiates the irradiating light on a broad area of the specimen that is broad compared with a smaller spot size of the irradiating light that is narrowed down to obtain a requested space resolution, and

wherein ~~in the above-mentioned~~ the stress calculating unit~~,~~ is adapted to use the ~~a~~ spectrum obtained by analyzing light generated from the specimen by light from the broad area irradiating ~~light~~ unit ~~is the spectrum in~~ as the predetermined state where no stress exists in the specimen.

28. (currently amended) A stress measuring device for measuring a stress in a specimen comprising:

a light irradiating unit that irradiates a specimen with irradiating light,

a spectroscopy unit that analyzes light generated from the specimen by the irradiating light from the irradiating unit so as to obtain spectrum of the generated light, and

a stress calculating unit that calculates a stress change in the specimen based on a shift of the spectrum of the generated light obtained as the specimen is irradiated with the light from the irradiating unit when the specimen is in a predetermined state and when the specimen is in a state different from the predetermined state,

wherein the light irradiating unit includes a broad area light irradiating device that irradiates the irradiating light on a broad area of the specimen that is broad compared with a smaller spot size of the irradiating light that is narrowed down to obtain a requested space resolution with scanning of the smaller spot, and

wherein ~~in the above-mentioned~~ the stress calculating unit~~,~~ is adapted to use an average of spectra of the generated light from the specimen in the broad area ~~is~~ as the spectrum in the predetermined state where no stress exists in the specimen.

29. (withdrawn) A method of measuring stress comprising the steps of:

providing a specimen to be measured;

irradiating the specimen with an electron beam;

measuring radiation from the specimen after irradiation with the electron beam; and

calculating a stress on the specimen based upon a spectrum shift between a first spectrum of the radiation when the specimen is in a predetermined reference state and a second spectrum of the radiation measured at a predetermined measurement position on the specimen.

30. (withdrawn) The method as claimed in claim 29 wherein the first spectrum of the predetermined reference state is determined by averaging a plurality of measurements across the specimen to approximate a stress-free state for the specimen.

31. (withdrawn) The method as claimed in claim 30 wherein the plurality of measurements represents an area of the specimen which is approximately 100 times as large or larger than the predetermined measurement position.

32. (withdrawn) The method as claimed in claim 29 wherein the predetermined reference state is determined by measuring the first spectrum while exerting a stress force on the specimen of a

predetermined value and the second spectrum at the predetermined measurement position is measured without exerting the stress force.

33. (withdrawn) The method as claimed in claim 32 wherein the stress force is applied mechanically to the specimen.

34. (withdrawn) The method as claimed in claim 32 wherein the stress force is applied thermally to the specimen.

35. (withdrawn) The method as claimed in claim 32 wherein the predetermined reference state is measured over a plurality of different stress forces to correlate the amount of external force and the corresponding spectrum shift.

36. (withdrawn) The method as claimed in claim 29 further including preparing the specimen to be measured by including within the specimen a predetermined material that can be activated by the electron beam to emitting radiation.

37. (withdrawn) The method as claimed in claim 35 wherein the predetermined material includes at least one element from a lanthanoid series of elements.

38. (withdrawn) The method as claimed in claim 36 wherein the ratio of the lanthanoid to the specimen is within a range of 1 ppm to approximately 10000 ppm.

39. (withdrawn) The method as claimed in claim 29 further including determining the composition of the specimen and adjusting the calculate stress on the basis of the determined composition relative to a predetermined composition standard for the specimen.

40. (withdrawn) The method as claimed in claim 29 further including controlling the temperature of the specimen during the measurement steps to a predetermined temperature.

41. (withdrawn) The method as claimed in claim 29 further including irradiating the specimen with a predetermined light radiation and measuring the radiation from the specimen after contact with the light radiation to provide a peak reference for compensation of the electron beam calculated stress.

42. (withdrawn) The method as claimed in claim 29 wherein the predetermined measurement position is irradiated by an electron beam having a diameter of 10 nm or less.

43. (withdrawn) The method as claimed in claim 29 further including measuring the residual stress in the specimen by measuring at least a portion of the specimen in a state without any residual stress and calculating peak shifts of the first and second spectrums.

44. (currently amended) A system for measuring stress in a specimen with an electron beam comprising:

an irradiating unit ~~for providing an electron beam to~~ that irradiates the specimen with an electron beam;

a measuring unit ~~for providing~~ that provides measurement signals of ~~the~~ generated radiation from the specimen after irradiation with the electron beam from the irradiating unit; and

a calculating unit ~~for calculating~~ that calculates ~~the~~ a stress on the specimen from the measurement signals by determining a spectrum shift between a first spectrum of the generated radiation from the specimen when the specimen is in a predetermined reference state and a second spectrum of the generated radiation from the specimen measured at a predetermined measurement position on the specimen.

45. (currently amended) The system as claimed claim 44, wherein the calculating unit is adapted to determine the first spectrum of the predetermined reference state ~~is determined by the calculating unit~~ by averaging a plurality of measurements across the specimen to approximate a stress-free state for the specimen.

46. (currently amended) The system as claimed claim 45, wherein the irradiating unit is adapted to directs the electron beam to enable a plurality of measurements representative of an area of the specimen which is approximately 100 times as large or larger than the predetermined measurement position.

47. (currently amended) The system as claimed claim 44, further including a stress force applying unit wherein the predetermined reference state is determined by measuring the first spectrum with the measuring unit while exerting a stress force on the specimen of a predetermined value with the stress force applying unit and by measuring the second spectrum with the measuring unit at the predetermined measurement position ~~is~~ measured without exerting the stress force.

48. (currently amended) The system as claimed claim 47, wherein the stress force of the stress force applying unit is applied mechanically to the specimen.

49. (currently amended) The system as claimed claim 47, wherein the stress force of the stress force applying unit is applied thermally to the specimen.

50. (currently amended) The system as claimed claim 47, wherein the predetermined reference state is measured by the measuring unit over a plurality of different stress forces exerted by the stress force applying unit to correlate the amount of external force and the corresponding spectrum shift.

51-53. (canceled)

54. (currently amended) The system as claimed claim 44, further including a composition analyzing unit ~~for determining~~ that determines the composition of the specimen and ~~adjusting~~ that adjusts the calculated stress calculated by the calculating unit on the basis of the determined composition relative to a predetermined composition standard for the specimen.

55. (currently amended) The system as claimed claim 44, further including a temperature control unit for controlling the temperature of the specimen during the measurement by the measuring unit to a predetermined temperature.

56. (currently amended) The system as claimed claim 44, further including a light radiating unit ~~for illuminating~~ that illuminates the specimen with light and a light measuring unit for measuring radiation from the specimen after contact with the light radiation to provide a peak reference for compensation of the electron beam calculated stress by the calculating unit.

57. (currently amended) The system as claimed claim 44, wherein said irradiating unit irradiates the predetermined measurement position ~~is irradiated~~ by an electron beam having a diameter of 10 nm or less ~~from the irradiating unit~~.